The Northwestern MILLER

MILLING PRODUCTION SECTION

WANTED: A Common Denominator For All Bolting Cloths

By Henry Nelson
Fisher Flouring Mills Co.

In the language of the miller, to bolt means to sift, and a bolting cloth is a woven fabric made specifically for sifting. Scalping, grading, dusting and flour dressing are all sifting operations, performed mechanically by means of bolting machines such as gyratory sifters, purifiers and reels, and in each process separations are made by particle size on a sieve or several sieves, which allow small particles to pass and overtail larger particles.

Many woven materials used for general purposes have also been tried for bolting cloth, and often used until something better came along. In historic times we know of sieve cloth woven from hair, linen, cotton, wool, silk, metal threads, and perhaps others; and some of them stayed a long time. Silk, for instance, which gained a real hold when Henry Bodmer in 1832 introduced a twisted weave silk bolting cloth, still shares most of the field with wire cloths. A newcomer in the field, comparatively, is nylon, a synthetic fabric, which, as we all know, since 1938 has been making its own great contribution to textiles generally.

Bolting cloths are very accurately woven fabrics. Their function is to separate mill stock into particle size groups and to control the quantity of these groups. It is noted at once that notwithstanding the fact that it is the size of the openings between the threads of the cloths which determines the limits of the particle sizes in the groups of sifted stock, our every-day bolting cloths are not marketed in uniform series of standard openings, as we have come to expect it in the much larger openings of perforated steel plate, pipe, tubing, etc., but rather in series of cloths which have stated numbers of threads of the maker's own standard to the linear inch. The number of openings per inch, also called the mesh count, equals of course the number of threads per inch, and the dimension of the openings is the width of the spaces, which were chosen to remain between the threads. Along with the mesh counts per inch, the respective aperture sizes are published in the manufacturer's catalogue, which also may contain lists comparing apertures of cloths of different materials.

Designed for Certain Stocks

Basically each type of bolting cloth is designed for certain stocks, and some of them are competitive. There is grit gauze, a heavy silk, used for scalping and grading, and fine silks for extracting flour from middlings. Wire cloths are also used for scalping and grading, and there are fine wire cloths especially designed for bolting flour.

Nylon cloth is woven mostly in the flour sizes. Operative millers choose between the different fabrics for their various requirements, their selection being influenced by such circumstances as the general nature of each stock, types of wheat ground, and perhaps the predominating climate; strength, durability and economy of the cloths are other determining factors.

Silk bolting cloths in use in flour mills normally range from about 16 to about 150 meshes per inch. Grit gauze is known by its number of meshes per Viennese inch, which equals 1.037 of our standard inches, and silk cloths are known by grade numbers ranging from 0000 to 0, and thence from 1 to 25. Silk bolting cloths are also made in several different qualities, since extra strength is needed for coarse stocks, which cause heavy wear. Commonly listed are "standard," "extra heavy" (X), "double extra" (XX), "treble extra" (XXX), and "grit gauze." The heavier qualities have thicker threads; a heavy cloth therefore has smaller apertures and less effective bolting surface than a light cloth of the same mesh. To keep the threads from slipping, the coarser cloths are commonly woven in "full twist," and intermediate and finer cloths in "half twist." That means, that in full twist every lengthwise thread, named the warp, and in half twist every other, consists of two threads of about half the normal thickness, one of which passes over, the other under the threads which go across the cloth, and which are called the woof.

Henry Nelson

Coarser separations of mill stocks more often than not are carried out on woven wire cloth made of smooth drawn wire. There are many metals and alloys to choose from, for example, steel, phosphor bronze, copper, brass, monel, stainless steel and tin coated steel. Also, grading and dusting are being done to an increasing degree on metal cloths woven from some of the above mentioned metals and alloys, and mills in some localities have used some for flour. The wire cloth is of a plain weave with square apertures and crimped, that is woven so as to arch the crossing wires over and under each other to prevent shifting of wires and so assure the mesh remaining permanently as originally woven.

The makers of metal cloth classify and sell their product according to the number of meshes per standard inch, but they do not all use the same thickness of wire for the same mesh in corresponding types of screen; obviously the thicker the wire is, the smaller the aperture and the effective sifting surface will be, and so it is, that two wire cloths of the same mesh number, but of different makes, likely will give somewhat different bolting results, just as two different weights of silk cloth, X and XX, for example, would give different results.

Similar Difference

A similar difference in bolting surface and in results exists also between some of the several types of wire screen put out by each manufacturer. A random example of two such types of wire screen made by the same manufacturer, taken from a set of comparative mill screen tables found in most mill offices, is Tinned Mill Screen, which is a screen made from a tin coated steel wire, and Durloy Free Bolting Mill Screen, which is a lighter mill screen made from an alloy. We shall refer to them in the following only as T.M.S. and L.M.S., respectively, while proceeding to illustrate the difference in the performance of any two types of cloth with dissimilar aperture sizes.

Let us suppose that 18-mesh T.M.S. break sieves in first and second break stacks were replaced on trial or in error by 18-mesh L.M.S. sieves. Probably about 3% of the total sifter loads would be taken away from the scalps to the second and third breaks and added to the streams to purifier No. 1. Based on the net amount of each of these streams, the heavy break streams would be decreased by more than 3%, but the much lighter purifier streams might be increased about 30% with mostly oversize particles, the quantity depending chiefly upon the aperture size of the coarsest grading cloth in the sifters, on the method of grinding, and on the condition of the break rolls.

The explanation is apparent. The 18-mesh T.M.S. and the 18-mesh L.M.S. cloths each have 18 wires and 18 apertures per inch; one wire plus one aperture then equals 1/18th inch in either case or 0.0556; but the diameter of the 18-mesh T.M.S. wire is 0.0150 in. and that of the 18-mesh L.M.S. only 0.0090 in., and the openings of the 18-mesh T.M.S. and the 18-mesh L.M.S. therefore 0.0406 in. and 0.0466 in., respectively. The opening of the 18-mesh L.M.S. sieve is 0.0060 in. wider or 14.8%, which makes the area of its opening 31.7% larger. Obviously these sieves should not be interchanged.

If, however, the 18-mesh T.M.S. were replaced with 20-mesh L.M.S., which is its near equivalent in aperture size, no radical change in the separations would take place, although an appreciable gain in effective bolting surface due to the lighter wires would be gained.

Different Results

Neither may similar number of grit gauze and wire or light wire screens ever be counted on to give equal bolting results; for various reasons, as the different thickness of the threads and the slightly longer Viennese inch used for expressing mesh counts of grit gauze. The use of a 72-mesh L.M.S., for example, in place of a 72-mesh G.G. in a break redust

(Continued on page 14a)

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The picture on the left above provides a view of the Anaconda mill. The buildings are largely constructed in concrete and provide a contemporary structure meeting specifications for housing the plant. The second picture shows the horizontal wheat silo with its mechanical and pneumatic conveyors delivering to the screenroom. The silo is of horizontal construction and consists of a line of bins partly excavated into the ground. These have a capacity of up to 12,000 tons of grain. This arrangement, it's explained, is useful when ample land is available as it is cheaper and simplifies conveying. The third photo shows the ground floor of the "Pneu-Flow" screenroom. The latest Robinson all-metal "Pneu-Scourers" and wheat brushes are installed. Their vertical pneumatic lifts enabled them to be placed on the lowest floor of the building.

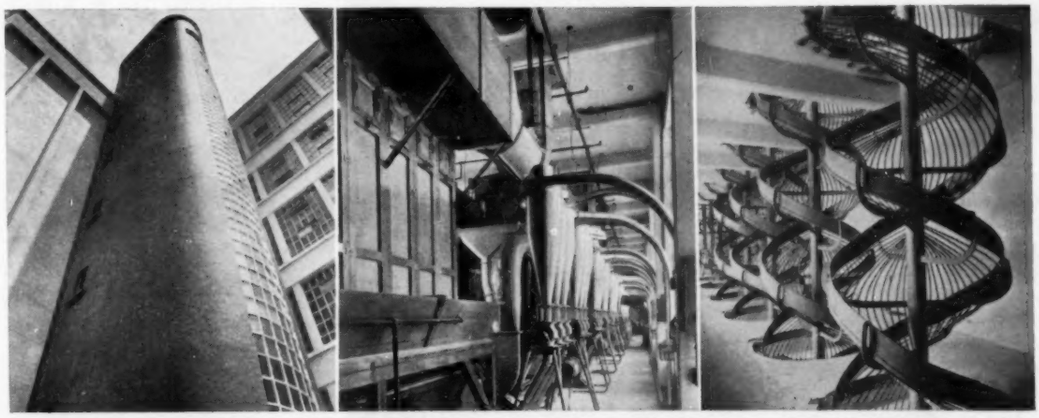
New Flour Mill in South America

Described as "one of the most up-to-date and attractive mills in the world" is the new mill recently started up for Anconda Industrial e Agricola de Cereais, S. A., Sao Paulo, Brazil. The new plant was planned, designed, equipped, erected and started up by Thomas Robinson & Son, Ltd., Rochdale, England, in cooperation with the Anaconda management.

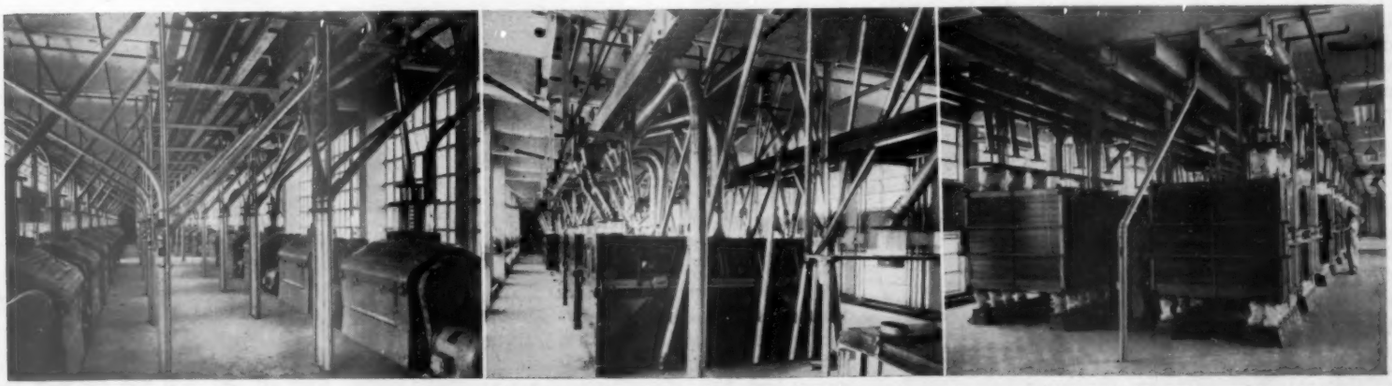
The plant was described at the recent technical conference of the Association of Operative Millers by Denys W. Povey, technical executive milling engineer for the Robinson firm. Views of the plant and some of its operations are provided in the accompanying pictures.

The project entailed designing of a building of contemporary architectural design, the design of silos of unusual horizontal construction, pneumatic conveying both in the all-metal screenroom and mill and the chain conveyor intake fed from railway sidings. The whole mill takes up six floors. There are two roller floors, three sieving floors, one cyclone and filter floor. The warehouse rises up to eight floors equipped with high speed packers and eight double spiral chutes capable of loading 16 trucks simultaneously. Each machine in the mill is equipped with its own electric motor drive, and there are 334 motors altogether, controlled by an elaborate system with sequence starting and stopping. Eighty-one pneumatic vertical lifts in the plant eliminate horizontal conveying.

Anaconda is an inland mill, largely dependent on rail transportation for wheat supplies and upon rail and road for distribution of finished products. The site is bounded on three sides by rising ground and on the fourth by railway tracks. Accordingly, the buildings are arranged in the form of an open-sided quadrangle with the intake end of the silo and the loading-out departments of the bulk and sack stores facing the railway sidings. Thus wheat is fed to the preliminary cleaning plant direct from railside unloading hoppers before being delivered to the silo. From there the wheat is conveyed to the screenroom and on to the mill. The finished product completes the circuit by way of the bulk flour store or the sacking department and the spiral chute sack storage.



In the picture on the left above may be seen the striking contemporary tower which gives access to the mill and screenroom of the Anaconda plant. In the second picture is one side of the top floor of the mill. Cyclones, seals, fans and dust collectors serve 81 "Pneu-Flow" lifts. The spiral storage chutes shown in the picture on the right run through eight floors and can deliver to 16 road or rail trucks at the same time.



The first picture above shows the second roller floor, and this is said to typify the spacious appearance of the plant. Illustrated are the "Pneu-Rolls," "Pneu-Flow" conveying and "Pneu-Spout" system. The main roller floor is on the lowest floor of the mill. This is made possible by the direct lift pneumatic system. The roller mills are individually driven. Automatic transformer starters enable groups of roller mills, etc., to be started up without the need to operate the individual starters mounted beside each machine. Illustrated in the second photo is the comprehensive purification system. The third picture shows a plansifter floor. Each of the machines in the photograph is individually driven.

Milling Industry Topics Covered At International Bread Congress

EDITOR'S NOTE: The Third International Bread Congress, held in Hamburg, Germany, at the beginning of June, was attended by 1,531 millers, bakers and scientists from 33 countries. Strong American, Canadian and British representations joined in the proceedings and Russia sent a party of eight. The congress heard 80 papers, delivered in various groups. The main divisions were grain breeding and standardization, grain storage and milling technology, baking technology, research methods, hard wheat milling and the hulling industry. The congress was organized by the Association of Cereal Research, Detmold, Germany. A leading participant in perfecting the arrangements was Dr. P. P. Pelshenke, who has done much to further the work of international research and, with it, the development of plans for the exchange of ideas among members of the milling and breadstuffs trades in various countries. There follows a selection of papers appertaining to the milling industry.

Wheat Conditioning

Dr. C. R. Jones, St. Albans, England, described recent British studies in wheat conditioning and drying.

The rate of penetration of water into immersed wheat grains is limited by the bran, not the endosperm,

INSIDE SCIENCE

The Vital Story of

FARINA and PASTINA ENRICHMENT

by Science Writer

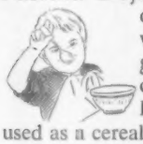
This article is one of a series devoted to the story of vitamin enriched or restored cereal foods; white bread and rolls, white flour, corn meal and grits, macaroni products, white rice, breakfast cereals and farina.

What is Farina? Sometimes called the "heart of the wheat," farina is wheat (other than durum varieties) which has been ground and bolted in granular form and from which virtually all of the bran coat and germ have been removed.

It is an excellent source of food energy, providing 370 calories per 100 grams. Its composition is largely carbohydrate (77.4 grams per 100 grams) with some protein value (10.9 grams per 100 grams) and low fat content.

This excellent, palatable food makes a fine dish for infants and children at any meal. For adults it is particularly good as a breakfast food when served with cooked or dried fruits. Being bland, it has a special place in the diets of the elderly and invalids of all ages.

Pastina Defined. Pastina is the product which is derived from durum wheat and with which egg yolks and sometimes other ingredients are processed. It, too, is an excellent food for babies and children and has a special place in adult diets, being used as a cereal or by being added to soups and broths.



Why Enrich Farina and Pastina? Because so much of the vitamin and mineral content of the wheat is contained in the germ and bran which must be removed to make farina and pastina, enrichment to restore important values is absolutely necessary.

New Enriched Farina Standards. The Food and Drug Administration of the U. S. Dept. of Health, Education and Welfare in June of 1955 changed the standards which all *enriched farina,* sold in interstate commerce, must meet. The new *maximum* and *minimum* levels (in milligrams per pound) are:

	Min.	Max.
Thiamine (vitamin B_1)	2.0	2.5
Riboflavin (vitamin B_2)	1.2	1.5
Niacin	16.0	20.0
Iron	13.0	*

*No maximum established

In addition to the above, the F. & D. A. allows the addition of other food elements at the manufacturer's option. Among these are:

Vitamin D . . 250 U.S.P. units per pound
Calcium . . . 500 milligrams per pound

Enriched Pastina. Enrichment requirements for macaroni and noodle products, of which *pastina* is one, are as follows. All figures are in milligrams per pound and include allowances for losses which may occur in cooking. These are standards established for the consumer by the Food and Drug Administration.

	Min.	Max.
Thiamine (vitamin B_1)	4.0	5.0
Riboflavin (vitamin B_2)	1.7	2.2
Niacin	27.0	34.0
Iron	13.0	16.5

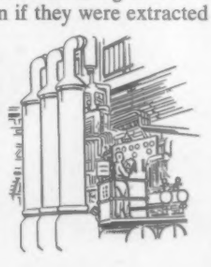
Again, the F. & D. A. allows manufacturers to add optional ingredients including vitamin D and calcium in the quantities noted below.

	Min.	Max.	
Vitamin D	250	1000	(U.S.P. units per lb.)
Calcium	500	625	(mg. per lb.)

Enrichment's Simplicity. Enrichment is really a simple process. The enriching ingredients (vitamins and minerals) are added to the food during processing. The consumer then receives farina or pastina which equals or exceeds the values of the original wheat in vitally important vitamins and minerals.

Physicians, nutritionists, dietitians —and consumers—support enrichment enthusiastically. It is such an important factor in public health that not only farina and pastina and other macaroni products, but family white flour, white bread and rolls, corn meal and grits and white rice are enriched.

Duplicating Nature. The science of chemistry is so advanced these days that many of Nature's complex substances can be duplicated in the laboratory. This has happened with many vitamins. First, the chemical composition is learned. Second, the pure substance is isolated. Third, a "duplicate" is made by synthesis. And fourth, the laboratory techniques are extended to large scale operation. The manufactured duplicate is identical chemically and in biological activity with Nature's own product. A vitamin is still a vitamin regardless of its source. So efficient is large scale manufacturing that vitamins are sold at a lower cost than if they were extracted from natural sources.



The Hoffmann-La Roche people make top-quality vitamins actually by the tons. To do this they use amazingly complex processes with scientific production controls and the latest equipment which fill buildings each a city block square and many stories high.

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Dr. Jones stated. Comparison of water absorptions in brief periods by whole grains and by separated bran placed the obstacle to water movement at a point mid-way through the bran. The obstacle was thought to be the hyaline layer but Hinton has recently identified it as the (adjacent) testa.

Although the testa is the thinnest, it is the densest of the major bran layers. Its practical significance is that it limits the water taken up by wheat during washing to that which can be absorbed by the pericarp layers.

In practice, the rate at which water taken up during washing moves subsequently into the endosperm is important. By means of a new method, depending on micro-determination of endosperm density, it has been shown that the rate of movement to the cheek centre is increased three-fold by a rise of 12° C. between 20° and 44° C. The results call for a revision of previous estimates of the effect of temperature upon the moisture-diffusion coefficient, an effect of significance in the theoretical treatment of wheat drying.

There has been a great need for data on the fully exposed drying rate for wheat grain at different temperatures. McEwen and his colleagues have recently published such data from which they derive the formula $\frac{dW}{dt} = 2.3\ m\ (W—We)$ where m is a rate constant, t is time, W is the total moisture content and We is the equilibrium moisture content of the grain. Values for m at various temperatures are given. The formula implies direct proportionality between rate of drying and the content of "free" water at any stage in drying of a given sample; such proportion-

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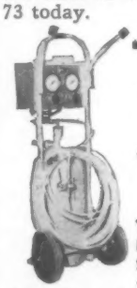

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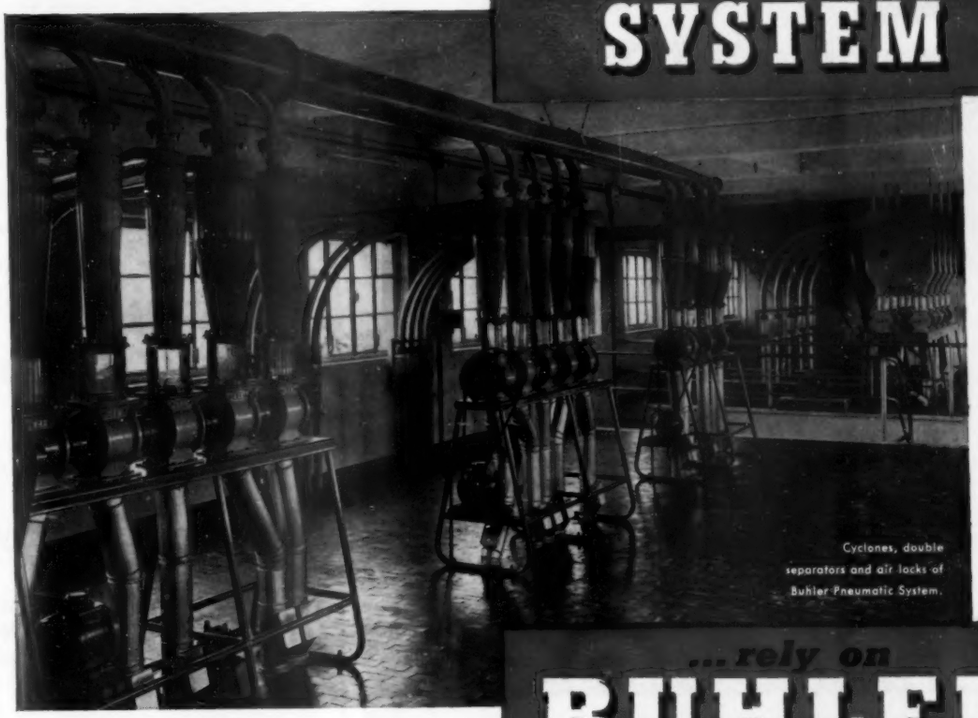

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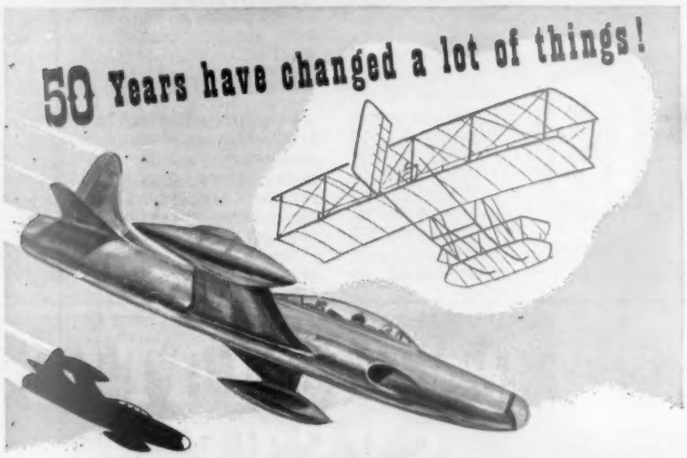

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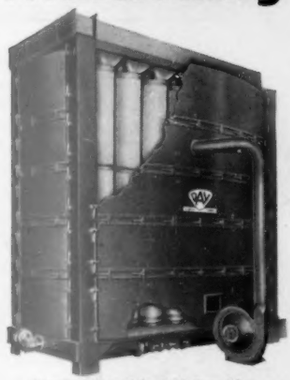

Cutaway view of the DAY Dust Filter —available housed or unhoused—for use on either vacuum or pressure. (Licensed by H. J. Hersey, Jr.)

Man's accomplishments in 50 years have been spectacular. Compare the 3 hour and 46 minute non-stop transcontinental flight made March 9th, 1955, with the 12 second flight by the Wright Brothers in 1903.

Striking progress in dust control equipment has also been made. The DAY "AC" Dust Filter, made under DAY and Hersey patents, is the *modern* filter to match *modern* methods. It handles up to *five* times more dust laden air per square foot of cloth area than out-moded conventional type filters. Filter tubes are cleaned *automatically* and *continuously*. At the same time this modern DAY Filter requires one-third less plant space.

17 GENERAL MILLS PLANTS EQUIPPED WITH DAY DUST CONTROL

One of the primary reasons for the selection of DAY Dust Control by so many of the leading flour mills is the DAY "AC" Filter. This filter is the "heart" of the DAY dust control system and provides such modern advantages as square-to-round air inlets, multiple screw conveyor discharges, high air-to-cloth ratios and high pressure reverse jet, self-adjusting cleaning rings. For an economical and effective solution to your dust problem write toDAY for Bulletin 528R.

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ality has previously been demonstrated in the case of rate of initial drying of different samples.

Other data at 46 C. are shown to support the results of McEwen et al and there is little doubt that their findings are valid generally in the range of temperatures mainly used in practical drying. Data presented show, however, that at lower temperatures

(i) their values for m are too low and,
(ii) in the progressive drying of a given sample the rate is not directly proportional to W—We.

The discrepancy, Dr. Jones explained, is attributed to the changing distribution of moisture within individual grains; at higher temperatures the market increase in diffusion rate eliminates non-uniformity of moisture distribution as a major factor in rate of drying.

A laboratory study of vacuum drying suggested that We should be regarded as a quantity governed not by equilibrium with moisture in the ambient air but by internal binding through forces that are affected by change in temperature of the grain. Thus an increase in wheat temperature of 11° C. corresponds to a decrease of 1% in the level of moisture content at which drying becomes very slow, Dr. Jones concluded.

Vibrating Technique

The possibility of employing the vibrating technique in connection with dosification channels, sieving and conveying channels, and vibrators for bin shaking was examined by Fritz Konigsmann, Dippoldiswalde.

The most important field for the vibrating technique seems to be that of the sieving machines destined both for purifying cereals and for the milling plant, Mr. Konigsmann said. It is known that vibrating purifiers have been proven in practice and that already interesting research work regarding their application in connection with purifying machines has been done. Scientific publications with regard to the employment of vibrating plan-sifters and their economy, however, are not yet available although in the patent literature publications referring to vibrating plan-sifters are already known.

Therefore, Mr. Konigsmann dealt with the problem from the viewpoint of examining the feeding and passage effects, taking into consideration the ash content in the case of an application of the vibrating technique in

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connection with plan sieves for fine grain in units of 100-200 microns. He examined also rye-milling products after the application of vertical, horizontal and a combined vertical-horizontal oscillation at different frequencies and at different amplitudes.

Comparisons were made under the same conditions with the normal plan-sifters with large amplitude and inferior frequency. The design of the experimental machine was described and various oscillating conditions were given.

Storage of Wheat

Dr. T. A. Oxley and Dr. Mary B. Hyde, British experts on storage and infestation problems, described recent experiments on the hermetic storage of wheat.

It is known that truly hermetic storage is in many respects successful in preventing deterioration of damp grain and in recent years a number of installations have been put into practical service in France, it was stated. Nevertheless, apart from the work of Blanc in 1938 and 1939, there has been no scientific study of the process. The details of the changes which take place in the grain and the limiting levels of moisture content are not known. The experiments were designed to fill these gaps in knowledge and to assess the practical utility of the method. The present paper is an interim report on the first few tests and therefore does not attempt to answer all these questions.

The work described dealt entirely with wheat, mainly of the variety Atle. The main criterion of quality used has been suitability for milling and bread-making which was measured by the Cereals Research Laboratory, St. Albans. Also studied were viability, microflora, and certain chemical changes.

Sealed glass jars and metal food cans were used for small scale experiments, and three welded steel silo bins, each holding 10 tons, for those on a larger scale. The moisture content of wheat tested fell into the ranges 12-14%, 18-19% and 23-24%, but the large scale tests dealt only with the two wettest of these ranges.

The main conclusions so far reached in these experiments are:

1. Most of the changes take place in the first few months of storage and their rapidity increases with moisture content.
2. The wheat remains bright in color and free flowing even after 18 months storage at 23-24% moisture content.
3. A sour-sweet smell develops in wheat of the two damper ranges tested but not at 12-14% moisture content. In the moisture range 18-19% the smell is not very pronounced and is largely removed by ventilation or drying. Some smell may persist into the flour if the storage exceeds 13 weeks but this is barely detectable in the bread. At 23-24% moisture content the smell is accompanied by a strong flavor. Both persist in the flour and to a much less extent in the bread.
4. Apart from slight softening, the mechanical flour milling properties of the wheat are not affected.
5. Intergranular oxygen is reduced to below 0.2% and replaced by carbon dioxide in approximately equal quantity at moisture levels up to 19% but at 23-24% carbon dioxide production continues for several months after exhaustion of the oxygen and causes a positive pressure which must be released from silo bins. Such escape of gas removes nitrogen and allows intergranular carbon dioxide concentration to reach 95%.
6. The viability of the grain is rapidly reduced and may even reach zero at the highest levels of grain moisture content in 13 weeks. At 18-19% moisture content the germination is reasonably well maintained for 20 weeks or more.
7. The mould flora of damp grain is reduced to a very low level in the first few months of hermetic storage and at 23% moisture content is virtually eliminated.
8. At 23-24% moisture content reducing sugars are considerably increased, sucrose reduced, and soluble nitrogen increased by hermetic storage.
9. Wheat at 24% moisture content, removed from hermetic bins after several months' storage, remained free from moulds and did not become warm for at least six weeks. Fresh wheat at the same moisture content became hot and mouldy in a few days.

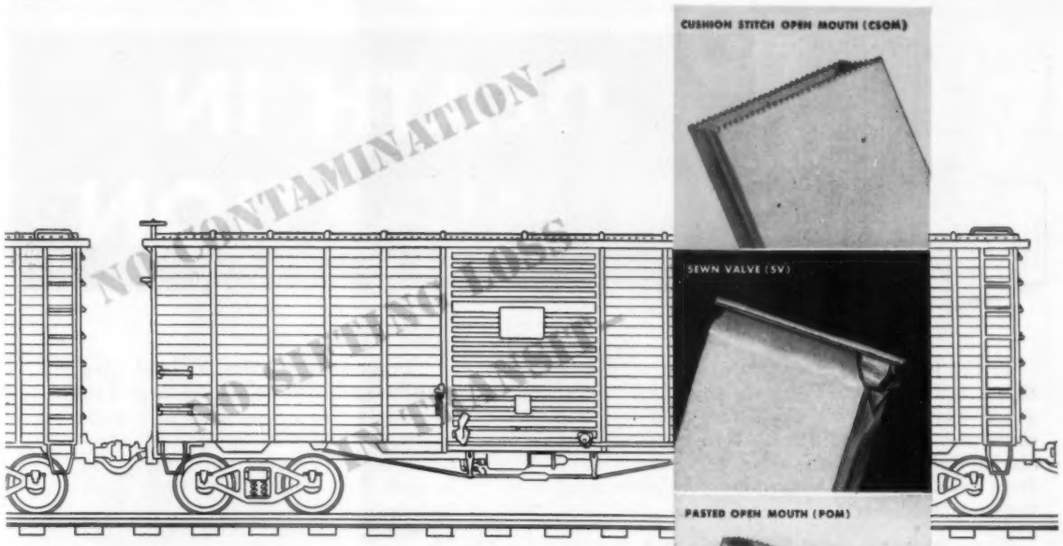
Process Control

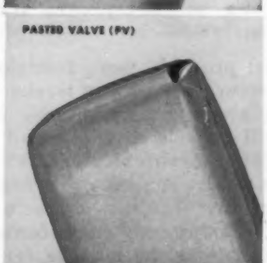
W. Hunsinger, an engineer of Frankfurt, Germany, presented a paper on considerations to be taken into account for process control in flour mills.

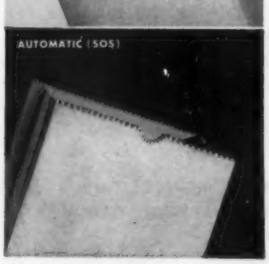
Process control of flour mills, Mr. Hunsinger stated, is characterized by the supervision of (a) the demand of energy for the various processes, (b) the quality and output of the relative products.

Paragraph (a) refers to the economical use of energy and trouble-free continuous operation, while paragraph (b) warrants a high productivity. This aim can be achieved the best by means of measuring and control instruments.

Remarkable installations of measuring equipment and control plants are already existing in the chemical industry, at power stations and steel







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mills, Mr. Hunsinger explained. Due to experience the cost for a sufficient instrumentation is about 10-15% of the total investment, when new plants are constructed. These additional costs will be compensated rather quickly by the improved quality and the increased output of the processes to be controlled, he claimed.

As to the fact that at flour mills only a few process controls exist presently, though the costs of energy vary between ¼ to ½ of the total operating costs, at least a supervision of the respective demand of energy is really advisable. The energy to be used for grinding is alternatively drawn from hydraulic or steam power, raw producer gas or electricity, respectively.

First of all the operating figures of the power generation must be measured and, in parallel therewith, the demand of energy during processing. A measurement like this warrants a close supervision of the plant with regard to its operating conditions and its relative efficiency. Exact determinations of the demand of energy for each ton of grain may lead attention to the economical advantage of stopping operation of the antiquated steam power set or possibilities of increasing the efficiency of the plant by the installation of a new hydraulic turbine or a new raw producer. Particular attention should be spent on the supervision of the demand of electricity, especially if supplied from outside.

Other important data on an improved plant supervision are: ventilation of the machinery, pneumatic transports in course of the dressing and cleaning process and similar operations, where also a considerable amount of driving energy can be saved beside a control of troublefree operation.

Instrumentations suiting the special requirements of supervision and control of the before-mentioned primary and operation processes, particularly with regard to steam generation and hot-water boilers, driving units, dressing, cleaning, and drying equipment, were discussed in detail.

During the dressing of the grains or their passing through the set of grinding rolls respectively, temperature measurement is a certain help for improving the quality. Continuously operating instruments for the measurement of the humidity of grains and flour would be of course desirable, but it is a matter of fact that a trouble-free design of respective primary elements was practically impossible up to now. Humidity detection seems to be reserved to laboratory tests, thus giving unfortunately only sample tests. There is no doubt that even in flour mills a tendency towards the automatic control with its outstanding advantage of warranting optimal operating figures automatically will arise. Therefore specific investigations and provisions regarding the controllability of the process itself and the design of the plants are necessary, Mr. Hunsinger concluded.

Testing Instruments

Dr. Ruth Bennett, England, dealt with current trends in Great Britain in connection with the use of flour testing instruments. The tests, she explained, should show how flour will behave under commercial baking conditions. Bread flour may be untreated or treated with chlorine dioxide, potassium bromate, ammonium persulphate or ascorbic acid, and the tests should be reliable whatever the treatment.

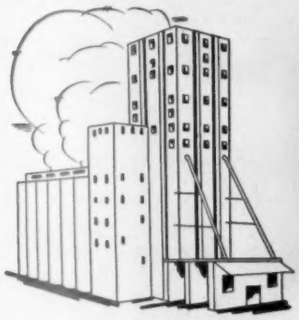
Before deciding on the best procedure the following points must be considered, according to Dr. Bennett:

1. How much water to use in mixing.
2. Whether to add yeast.
3. How much salt to add.
4. How long to allow the dough to rest between mixing and shaping and how long between shaping and stretching.

Water requirements of flour should be measured at the end of fermentation, that is at the dividing stage, because this is the stage of greatest importance to the baker. Yeast is desirable in the dough because without it, the effect of increased fermentation time on an untreated flour is not revealed. The effect is, however, revealed in a treated flour. The dough should be allowed at least three hours rest after mixing and should then be moulded (or shaped) because without this time and moulding, the "improving" effect of bromate is not fully revealed.

The standard Brabender and the standard Chopin methods each fail to meet some of these requirements, Dr. Bennett pointed out. On the other hand, the Simon method fulfils them. An alternative procedure using the Brabender Farinograph and Extensograph was suggested, by which these difficulties can be overcome. The method has been used for some months in the British laboratories. In principle this resembles the method devised by Dr. Halton and used on the Simon instruments.

Water absorption is calculated from the minimum mobility of dough remixed three hours after mixing. A dough containing yeast and salt is mixed and is kept at 27° C. for three hours and is then divided, shaped and stretched as usual. The results of tests made, for example at 1, 2, 3, 4 or 5 hours after mixing, agree with the bread baked at the same time, independent of the particular form



DEATH IN FUMIGATION

In the last few years we've heard of a half dozen deaths from asphyxiation by ordinary grain fumigants. We know of several other cases where only rapid rescue efforts prevented similar fatalities. These cases represent deaths from relatively non-hazardous fumigant mixtures—not highly toxic fumigants.

However tragic these fatalities are, it is even more tragic to contemplate that such deaths will continue unless there is wider dissemination of basic knowledge on the actual hazards involved. Most of the comments heard reveal little conception of the essential danger. For example, a frequent comment is that the victim might have been saved if he had had a "good gas mask" or a "proper canister." What's wrong with such statements?

Just this: probably more fumigation fatalities have occurred with gas masks than without. Although a good gas mask and proper canister will provide a measure of protection against light gas concentrations, they *will not* protect the wearer against really heavy concentrations. In other words, when the user fails to understand that masks and canisters have definite limitations, he may be far worse off with a mask than without one. For if he had none, he would not be tempted to enter heavy gas concentrations or descend into low, inaccessible areas where he might be overwhelmed by a gradual build-up of gas. Hard to believe, isn't it?

Here's what manufacturers of gas mask canisters say—typical warnings taken from various canisters:

"Canister type masks, regardless of make, can only be worn safely in relatively low concentrations of gas . . . . ."

"This canister gives respiratory protection . . . . when the concentration does not exceed 2% by volume."

"Although this canister will give respiratory protection against 2% of such gases as hydrocyanic acid, sulphur dioxide, chlorine and phosgene, it is not recommended for use in such high concentrations because hydrocyanic gas will cause poisoning by absorption through the skin, and the others are extremely irritating to the skin."

Do such warnings add up to a guarantee of complete safety? We think not.

Who can tell a 2% gas concentration? You can't see it. You can smell it but your nose won't measure it. And dust explosion hazards bar the use of most gas-measuring devices.

Then what's the answer? Very simply, *you have to use your head around all grain fumigants.* You have to avoid like the plague areas where gas concentrations are apt to build up.

With or without a gas mask, during and after fumigation: Stay out of large flat storage units. (You can always cut openings and use pressure apparatus rather than risk a man's life.) Stay out of ordinary bins. And, particularly, stay out of dumps and pits where fumigant gases will accumulate and displace most of the air, thus lowering the proportionate oxygen content below the point where it can support life.

One more point: In at least two deaths the victims were found with their masks off. Why? We believe that in each instance the victim tore off his own mask. If so, why? Because 9 men out of 10 will instinctively do just that the moment they experience the strangling sensation which occurs in very high concentrations of fumigant gases.

If you want more complete information on the proper use and limitations of gas masks, the "Weevil-Cide Fumigation Handbook" devotes 7 pages to that subject.

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of treatment given to the flour, Dr. Bennett concluded.

Corrugation

Some observations on corrugation, particularly in connection with differences between German and American milling techniques, were examined by P. Heinze, Hamburg.

It is known generally that there are essential distinctions of corrugation between American and German flour mills. These distinctions did not rise by accident but by years of observation and experience of the existing milling conditions. So the American mills work with far shorter roll-surfaces but with higher revolutions, and on average they are satisfied by lesser yields than German millers, Mr. Heinze said.

The mark of the German diagram is still—"breaking in 6 grinds and a roll-surface over all of about 60 m/m per dz/24h." The present share of foreign quality wheat enables the miller to work with these roll-surfaces without having any milling disadvantages. In this coherence it should be clear that today's changed milling conditions need an individual adoption of corrugation. If there exist certain distinctions in the kinds of corrugations and in the U.S. as is well known, several kinds are used, they use in principle the position of R:R. The differences between position S:S and R:R are fixed in the following:

S:S	R:R
More coarse semolina	More fine semolina and dunst
Less break flour	Flour, purer and of lower ash content
Cooler grinding	Better extraction
Less energy	Broader bran
Larger capacity	Longer life of corrugation

Comparing American and German roll-corrugations, consideration has to be given to the more dry milling in the U.S. with a flour moisture of 13.5-14%. Summarizing it can be said that dry milling, moderate yield and production of fine sifted flours allow the American miller, on account of the available good quality wheat, to run the rolls with high speeds and to be satisfied by roll-surfaces of 30 to 40 m/m dz.

The German milling situation requires more than ever before to work as economically as possible, but on the other hand on account of the incomparable higher wheat-prices, the German miller has to gain higher extractions of flour with low ash content. An expedient to this is to inlay rolls corrugated R:R to the break system which comes into question. There is no doubt, Mr. Heinze claimed, that R:R works more satisfactorially, which is proven by the bran staying broad. The slight rising demand of energy is unimportant in view of better results of extraction.

Concrete Storage

Hans Fischa, Vienna, Austria, described methods of storing flour in concrete silos.

The installation of the bucket conveyor for transport in a vertical direction, and of the screw conveyor for transport in a horizontal direction make automation in the flour milling industry possible to an extent which could not be attained in other industries. Only the unloading of grain, putting into sacks of milling products, storing and transport to the mills, remain still questions of rationalization and increasing productivity, Mr. Fischa said. The storage of grain in bins is already no problem. Therefore, experts began to install this kind of storage for flours too, whereby the different characters of the materials —for example with regard to flowing ability and other qualities — were taken into consideration. Milling industries in different European and overseas countries have studied these questions in recent years.

When storing flours in bins, the following points must be considered, Mr. Fischa said:

1. The outer insulation of the bins, to avoid a sudden variation of temperature inside the bins.
2. Care for equal feeding the bins, if possible over the whole basis.
3. Building the bins in a suitable shape, to avoid flour arching when discharging.
4. Use of bin dischargers for the flour, which permit a mix to be made while discharging.
5. The feeding and discharging systems must enable exact control of the quantities.
6. Equipment for the automatically mixing of flours to blend flours together in any desired proportion.

When planning the new flour-silo, all the above mentioned facts have been included in the building program.

To feed the bins new mixing distributors are needed (a kind of throwing-charging machine), which loosen the flour, ventilate it and spray it like a fine haze into the bin.

The plant is divided into two halves, for light and dark flours, which are neither mechanically nor electrically connected, in order to exclude faulty manipulation. Each of these parts disposes of its own transport systems to feed the bins after weighing, and for discharging also of two separated transport-systems which operate through the same weighing system when feeding. An adjustable, electri-

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cally operated locking of the weighing machines of each system permits the production of flour blends in any desired proportion. Therefore, it is possible to mill wheats of different grinding abilities, to utilize the actual grinding qualities in the best possible way, and to blend the received grinding products according to the market requirements, after separate storage.

Through the arrangement of the sacking installation above the flour bins a simple distribution to the single loading places is possible. The whole plant is fitted with distant controlled separate drives, which are operated by a central commanding place, so that only one person is required to supervise the whole flour silo.

According to experience up to now, the quality of flour is in no way influenced by the storage in concrete silos. The state of health of the flour is even much easier to keep under control. The right moment of mixing and working up can be well accommodated with the extreme maturity of the flour.

This flour-silo-plant has already been in operation for one year and has met all requirements, which were theoretically expected when planning, Mr. Fischa concluded.

Electron Beam Generator Installed At Michigan State

EAST LANSING, MICH. — A machine that has been termed one of the biggest advances in research equipment in recent years has been installed at Michigan State College. It's an electron beam generator—also called a cathode ray machine.

Here are a few of the already-known things the million-volt generator can do, according to Dennis E. Wiant, in charge of the device:

It can kill grain storage insects or make them sterile at a cost of about a cent and a half per ton for electric current.

Scientists believe the machine can prevent mold on wheat. That would mean grain could be stored at a higher moisture content and that the machine may be practical for use by elevators.

Bread treated with this machine can be kept at room temperature for many months without molding.

It can increase the shelf life of various products. The ray device can be used by the plant breeder to change the chromosome arrangement in seed. This can speed up research toward new varieties of plants.

The powerful device has been installed behind two-foot-thick concrete walls in the agricultural engineering building at Michigan State. This is to protect workers from the rays. The electron beam generator, however, is less hazardous than an atomic radiation machine. The electron machine uses electricity for its irradiation energy. The atomic machine, more expensive to use, gets its energy from radioactive material. The atomic radiation is more penetrating, but also much slower in action.

The college has rented the device from General Electric Co.

—BREAD IS THE STAFF OF LIFE—

Interest Grows in New Midwest Unit Of Plant Sanitarians

ST. LOUIS—Interest is growing in the new Midwest Section of the Association of Food Industry Sanitarians organized here this year. Organized officially April 7, the section actually had its start at a meeting which took place in St. Louis Feb. 24.

Guiding in this organization has been J. Carl Dawson, Ferguson (Mo.) Fumigants, a member of the AFIS membership committee, and Edward L. Holmes, American Sanitation Institute, of the publications committee. A formal petition to the national association for a sectional charter was drawn up April 7 and since has been accepted by the AFIS.

Twenty to twenty-five representatives of food plants in and around St. Louis have become members of the Midwest section and membership is open to any personnel in the area interested in sanitation work around food processing plants, Mr. Dawson said.

New officers of the section include Joseph E. Stieferman, Walter Freund Bread Co., St. Louis, president; Harold Rakop, Switzer Candy Co., St. Louis, vice president, and Dale Blackwell, Union Starch and Refining Co., Granite City, Ill., secretary-treasurer. These officers together with Mr. Dawson and Mr. Holmes form the board of directors.

At the first regular monthly meeting April 28 Leonard Levin, St. Louis sanitation consultant, was the principal speaker. At the May 25 meeting William Schoenherr, chief entomologist, Lauhoff Grain Co., Danville, Ill., spoke. After a summer break, the meetings will be resumed in October and will continue at regular monthly intervals.

After meetings resume in the fall, it is expected that membership in the section will build up to close to 100. Anyone interested in membership is asked to communicate with the secretary for further details.

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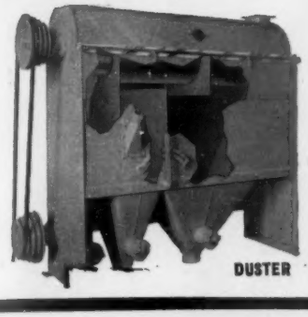

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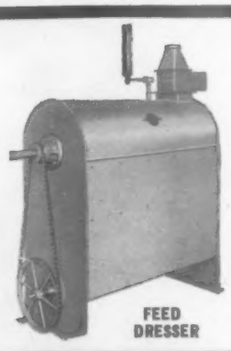

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Weighing Grain in Small Batches Is More Accurate

COLUMBUS, OHIO—If you want to measure the amount of grain loaded into a tank, would you expect to get a more accurate measurement by weighing the material in many small batches or in a few large batches, all other things being equal? Many small batches is the answer, according to Ingram Richardson, president of Richardson Scale Co., Clifton, N.J., who spoke before a recent meeting here of the National Association of Scale Mfrs.

Over a series of bulk weighings there is a natural tendency for small overages and underages to cancel out—so the greater the number of weighings, the better chance there is for the cancelling out process to take place. This is particularly true with mechanical repetitive weighing when the unpredictable human element is eliminated.

In loading grain into railroad cars, for example, statistical analyses of tests show that a scale of moderate capacity (1,500 lb.) will weigh out a carload more accurately than a scale of large capacity. Using statistics and charts prepared by his engineering department, following tests in the Richardson plant, Mr. Richardson explained these tests and the conclusions resulting from them.

The tests involved a series of grain weighings made on a standard Richardson MMM 25 bu. automatic grain scale, an even-arm beam scale with an S-R (sensitivity) of 2 oz. in 1,500 lb. Two series of 80 test weighings each were made on this scale. Total amount of grain weighed during these tests represents the equivalent of two 120,000 lb. capacity carloads. No adjustment of any kind was made to the scale during the series of weighings.

Figures for these tests were plotted in graph form and the following statistical conclusions were reached: none of the 160 weighings showed a variance of as much as 0.1% from the true (test) weight of the grain; and the total weight of "heavy" weighings was almost identical to the weight of "light" weighings (less than 1½ lb. variance in either case). In terms of such individual weighings this means that the chance of a 0.1% or more weight deviation is less than one in 2,000.

Turning the accumulation of such weighings into carload weights, statistics showed the net error on the first carload was 0.001% and on the second, 0.005%. By using relatively small (1,500 lb.) and numerous grain weighings, variation in total carload weight can be reduced to less than 0.01% in 99.7% of the cases. Such accuracy is due to the tendency of a large number of small weight variations to cancel one another.

In applying the above statistical analysis to actual practice, he said, it is up to the supervisor to see that the automatic scale is set for the correct weight of 1,500 lb., so that inevitable deviations from perfect weight are distributed plus and minus. The even-arm beam of the automatic grain scale indicates these deviations and permits such proper setting.

According to Mr. Richardson, most scales in normal use are not controlled to closer than 0.1% on individual weighings. Consequently, smaller and more numerous weighings would tend to allow individual variations to cancel one another.

General Mills Expert Sees Much Good in Automation

SAN FRANCISCO, CAL.—An industrial scientist recently cited the automatic machine as an American hope for combatting inflation, assuring healthy business conditions in the future and maintaining leadership in competition with Russia.

In an address before the National Conference of Social Work at the San Francisco Civic auditorium, Dr. Cledo Brunetti, director of engineering research and development for General Mills, Inc., listed reduced cost of products, increased output and greater efficiency among the benefits from progress in industrial mechanization. He predicted the rise of automation will create more good jobs for the country's labor force instead of precipitating unemployment.

Emphasizing that the push-button factory is still far in the distance, Dr. Brunetti said that automation actually should be defined as nothing more than the continuing improvement in the tools we use. A rapidly increasing population and a stepped-up demand for consumer goods, he said, make mechanized progress a necessity.

"If production dips, there will be a greater demand for the proportionately fewer goods and services available and inflation will result," said Dr. Brunetti. "Increased productivity will be the only sure method of controlling this."

He added that business survival in the face of competition makes mandatory the finding of new ways to reduce costs by increasing productivity. Dr. Brunetti warned that this competition extended into the international sphere, that national self-

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preservation dictates accelerated mechanization. Russia, he pointed out, will graduate 45,000 engineers in 1956; the U.S. will graduate only 27,000. Meanwhile the Soviet Union will train 1,600,000 technicians as compared with 50,000 in the U.S.

"What has automation brought to industries that have adapted automatic means of increasing their output?" Dr. Brunetti asked. "They have shown striking growth. They have succeeded in reducing costs of their products, have successfully met competition, have enlarged their markets by increasing consumers' purchasing power through reduced prices. Reduced costs and a resultant increased demand for goods and services have continually meant increased manpower requirements.

"Let us not," Dr. Brunetti urged, "underestimate our American worker's intelligence, his capacity to be excited by the challenge of change and his ability to adapt himself to that change. Let us strive to keep it in balance, but let us not resist change, particularly when we know that in the long run we shall all be better off for it."

Quaker to Build Feed Mill in Chattanooga

CHICAGO—A new feed mill will be constructed by The Quaker Oats Co. in Chattanooga, Tenn., it was announced recently by I. S. Riggs of Chicago, vice president in charge of feed sales.

The feed mill will be constructed this summer as an addition to the company's corn mill.

The new mill is expected to begin operations early in 1956, with a production capacity of 60,000 tons

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AGRICULTURAL CHEMICALS DIVISION

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BOLTING CLOTHS

(Continued from page 1a)

sieve stack, would reduce the overs going to the break redust purifier very considerably, since the apertures of the 72-mesh L.M.S. are a good deal bigger by comparison; it would also effect a change in the nature of the throughs going to the middlings roll, due to the inclusion of a quantity of stock of slightly larger size and probably higher ash, which may or may not be desirable, depending on the case. If the 72-mesh G.G. had been replaced with a 80-mesh L.M.S., which is its equivalent in aperture size, no great change in the separation would have occurred.

When a comparison is made in mill screen tables between the full ranges of grit gauze and L.M.S. cloths, it is found that grit gauze in the coarse range has the larger apertures of the two for similarly stated mesh counts, but in the finer range L.M.S. has the larger apertures by comparison; a danger in making hasty conclusions as to the comparative bolting performance of wire and grit gauze is therefore immediately apparent, especially when a wide range from fine to coarse is used, as in purifier covers. The range of the purifier cover should usually be approximately equal to, but a little more open, than the grading range of the stock going to it. In all cases, but especially when both wire and grit gauze are used in a mill, the aperture sizes of the grading sieves involved should be ascertained from available tables and the selection of purifier cloths made on the basis of them.

Nylon bolting cloths, too, have aperture sizes different from those of other fabrics. When nylon fabrics first were tried for bolting cloths, carrying the grade numbers customary for silk, based on the mesh count, it may have been taken for granted (or, at any rate, fondly hoped) that they would make particle size and quantity separations analogous to those made by silk cloths having the same mesh count per inch. The widths of the mesh apertures, however, only in a very few cases corresponded with the openings of the silk cloths, and hence they did not perform alike. As in the case of other bolting fabrics, lists showing the widths of the apertures are therefore needed for guidance; and at least one maker, thinking it illogical to grade his product like a different fabric with only the mesh count in common, and knowing each would perform according to its own aperture size, chose to designate it with a grade number expressing the main deciding bolting factor, namely, the width of the opening in microns.

In the evolution of bolting media we recognize the surviving ones as superior in their own right, and each is used where it is thought to give superior performance. In order to use the present available bolting media to best advantage then, one apparently should not only be able to select the fabrics best suited to the various jobs under given conditions, but having selected them, one also requires a uniform, ever-present measuring stick to help correlate them to use them together properly.

It is agreed that a most essential part of bolting is control of the particle size. It would seem then, that one essential requirement for good

efficient selection and correlation of bolting sieves would be an awareness of the particle dimensions.

We can measure small particles by test sieving, but have not learned to think in terms of measuring units except in isolated instances, as the maximum particle size of flour, which is so specified in the federal flour standard. Rather we express particle sizes of a separate relatively by the names of the sieves which handled it, in terms like: through an "18-wire" and over a "36-grit gauze," often omitting the words "wire" and "grit gauze," and we know the maximum size is determined by the openings of the 18W, and the minimum size, generally speaking, by the openings of the 36GG; but we do not know the size of either without referring to the manufacturer's tables.

Only in a very general and roundabout way will the mesh count of a cloth carry an idea of the particle size that it will pass: the smaller the number, the larger the particles, and the higher the number, the smaller the particles; and no general factor exists, which will enable us to calculate the particle sizes in standard measuring units from the mesh count per inch, as the area in the cloth taken up by the threads increases rapidly, but not always uniformly, in proportion as the number of threads per inch increases and the effective bolting surface decreases. Furthermore the threads in similarly numbered meshes will vary according to material and design of maker, and apertures vary too to the same extent and hence the particle sizes.

Go Back to Source

For correct, authentic information about aperture size measures, which it has been found is the main controlling factor of particle size separation, we must go back to the source of the bolting cloth, namely the manufacturers themselves or their representatives, who are ready and willing with stock lists, tables of exact aperture sizes, and other pertinent information and suggestions, which they know the users of their products have need of to make accurate selections, and only hope they will make use of to the greatest possible extent.

It has been satisfactory and usually not too difficult to refer to such tables to compare aperture sizes of the cloths involved, after which they generally were quickly forgotten. We assume of course, that the right tables, which listed the particular brand and make of cloth which was used and that which it was proposed to try out, were available. The correct aperture size must always be known and never assumed; it will not be safe, for instance, to depend on tables received by hand or by mail, which list makes of cloth you do not use. When new cloth is ordered, aperture size should be indicated, and checked again when received. It is important that you know not only the brand, and hence the aperture sizes, of whatever new cloth you are purchasing at this time, but also the brand and aperture sizes of the present mill clothing and all the stock, including odds and ends, which now is in the storeroom, and which you are using for replacements.

Wire cloth lasts practically forever when in storage, and probably nobody knows where some of those slowly-moving sizes on hand were bought; so as to their aperture sizes perhaps one ventures a guess and takes a chance; or perhaps one plays it safe and uses them up for purposes other than bolting. It never is too late to resolve and direct, however, that all lots of bolting cloth must be tagged or otherwise marked with brand, mesh, and aperture size as long as any is left; of these the aperture size is the most important and also the most difficult to ascertain if the tag is lost.

Although the logic of selecting bolting cloths by aperture size has been conceded and sometimes even taken for granted by operative millers, strangely enough, with selection accomplished, all have been perfectly content to disregard the means of selection for identification of these carefully selected sieves, and name them instead by their, for bolting, rather irrelevant characteristic, the mesh count per inch. It may be that we like those old familiar-sounding mesh numbers, which at least may be verified by counting, and that the aperture sizes stated in inches, when we must refer to them, inspire fear and dislike, because they are expressed commonly as four-figure decimal fractions.

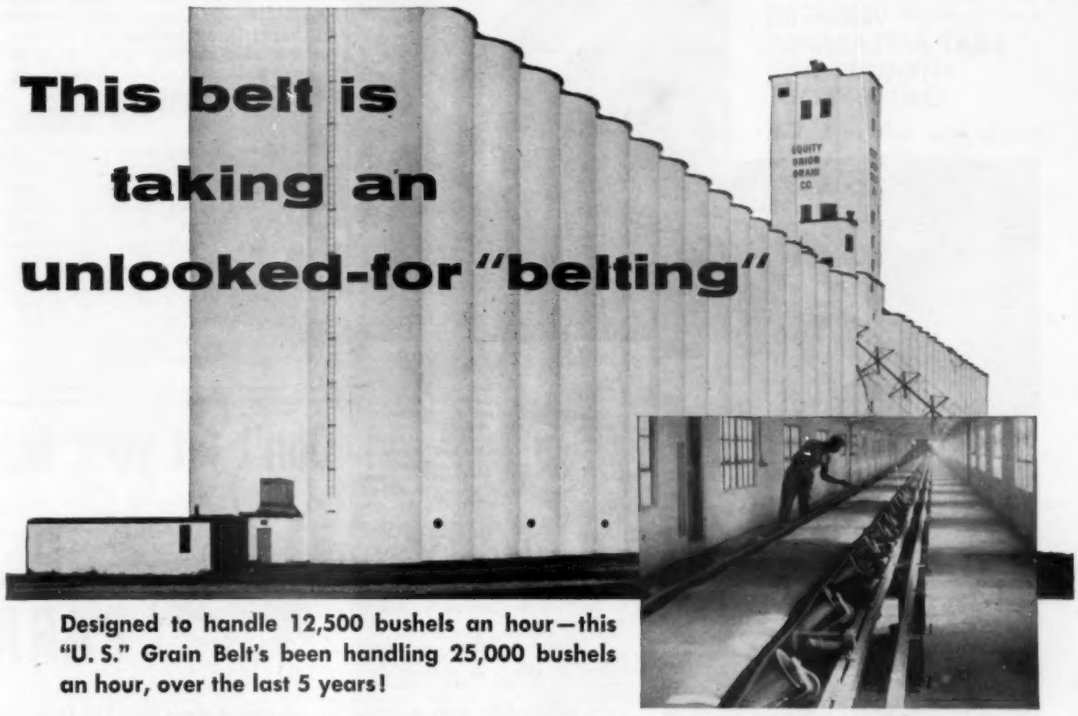
The Micron

There exists, however, a measuring unit suitable for a scale of whole numbers, which lends itself well to

Symposium Slated For Boston Oct. 19-21

BOSTON—A symposium on applications of radioactivity in the food and food processing industries has been scheduled for Oct. 19-21 at the Sheraton Plaza Hotel, Boston.

Primary objective of the symposium will be to acquaint members of the industries with past uses, and possible future applications, of radioisotopes in research, development and process control.



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(over ordinary duck)

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(over ordinary duck)

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the setting up of a convenient aperture size and particle size range scale in a manner easily grasped. This unit is the micron, a subdivision of the millimeter. It is being used in a specialized field at this time, as we shall see, and only waiting for the miller to pick it up and make use of it.

In this country the inch is a standard measuring unit, and the specifications of our commercial bolting cloth, that is the mesh count, diameter of threads and width of apertures, are always noted in inches; but not exclusively so, for manufacturers of some kinds of bolting cloth list the diameter of the threads and the width of the apertures in both inches and millimeters, and on factory made test sieves the apertures are marked on the identification plate in both inches and millimeters. (One inch equals 25.4 millimeters.)

There are several reasons for believing that the second mentioned designation, the millimeter, would be better adapted generally to our purpose, or rather its sub-division, the micron designation, the micron being one-thousandth of a millimeter. The U.S. Bureau of Standards for instance, now known as the National Bureau of Standards, has for many years based the Federal Series of Standard Testing Sieves on the millimeter (1,000 microns), choosing this unit as the stipulated width of the opening of a No. 18, 17.15 mesh per inch, test sieve. The federal flour standards are based on sieves contained in this series, the standard for white flour being based on the opening of a No. 100 U.S. Standard sieve, which has an aperture width of 149 microns. The British Standard Series and the Tyler Standard Series are very similar to the U.S. Standard. Scientists conducting research with flour and other finely divided materials everywhere are consequently conducting their work almost entirely in micron units.

Also it happens in the realm of the practical miller that a sieve very commonly used for scalping, varying in aperture size according to make, of course, but usually designated as "18W," roughly equals the basic sieve of the U.S. Standard Testing Series, the previously mentioned No. 18 U.S. Standard, the opening of which is one millimeter (1,000 microns). The biggest particle passing through the coarsest scalping sieve therefore approximates 1,000 microns, and this fact may in our estimation establish 1,000 microns as the top of one single convenient measuring scale for sieve openings and particle sizes, ranging from 1,000 microns, or near that, down to 89 microns for a No. 15 XX silk, and even less for particle sizes encountered in research work; a scale which may be used along with all of the different commonly known

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lists of grade numbers and mesh counts.

To illustrate how these compare with the micron scale, examples of a variety of bolting cloths of very ordinary mesh counts have been listed as follows:

18 mesh Wire (T.M.S.)	1031 microns
36 mesh Durloy (L.M.S.)	541 microns
54 mesh Grit Gauze	350 microns
72 mesh Grit Gauze	223 microns
No. 9XX Silk	147 microns
No. 146 Nitex (Nylon)	146 microns
145 mesh Durloy (L.M.S.)	119 microns
No. 15XX Silk	89 microns

Some of the cloths purposely were selected so as to be multiples of 18, or almost exactly so, making the two following progressive series of mesh counts per inch: 18, 36, 54, 72, and 18, 36, 72, 145 (for 144). If one were tempted to assume that a uniform series of mesh counts would result in another uniform series of aperture sizes, the aperture widths tabulated in microns following the respective cloths quickly disprove it. Except in special test sieves no uniform relationship between aperture sizes exists, whether the cloths be selected from the same material or not.

It is evident that the micron as a common denominator for all types and makes of bolting cloths can make proper selection and correlation much easier if given a fair chance. That means, that the width of the aperture, in microns, must be accepted as the effective size of the fabric; it means that it must be made a part of the description of the cloth, and as such given a place on the sieve and in the flow sheet.

Accordingly it is suggested that the operative miller initiate the same practice for mill sieves, that makers of testing sieves always have used, namely stamping the aperture size of the bolting cloth on the frame of each made up sieve. Here the micron denominator, being the most important of all, should precede the customary identification; thus a 54-mesh GG, having an opening of 350 microns, would be marked "350 (54GG)," and a No. 12XX silk, with its 107 micron opening would be "107 (12XX);" but the designations might possibly later on be shortened to "350GG" and "107XX," for mesh numbers are never used to designate flour silk even now, and it is likely that all mesh numbers, being of no consequence except for purchase and storeroom records, would become obsolete as far as operating is concerned, when supplemented or replaced by the significant micron aperture number.

The hazard of making careless or hurried, incorrect substitutions is completely eliminated, for the micron designation, appearing on the fronts of the sieve stacks, offers the miller something it has been difficult for him to get and retain before, namely a real knowledge of the actual particle sizes of the various mill streams at all times, and he will be able to control them more intelligently and combine them more efficiently.

Particle size data of the various mill streams should be kept available for present and future use, and if it is entered in the flow sheet it is automatically assured permanence, as these usually are kept indefinitely. It is further suggested, therefore, that the aperture sizes, in microns, of all sieves and of all purifier, reel and bran and shorts duster clothing, be added on the mill flow sheet and on all supplementary mill clothing records, in the same manner as suggested for the marking of each sieve. With the measures of all screen aperture sizes in the mill flow carefully stated in microns, the present, sometimes confusing, cloth designations may be given only secondary consideration. The flow sheet becomes a better operating guide, because not only can one tell where the streams come from and where they go, but also at the same time the particle sizes contained in each: the minimum size for scalps, as "plus 1,031 microns," and the minimum and maximum sizes for all others, as "350 to 541 microns" for a certain purifier stock and "zero to 107 microns" for flour through a No. 12 XX silk.

This information is deduced from the aperture sizes of the respective screens, as they divide the streams into smaller ones for further processing. It must be kept in mind, of course, that since bare bolting is not practiced, each sifter stream usually also contains a small portion of particles smaller than the apertures of the screen it tailed off; and that the maximum particle sizes of purifier separations usually are a little smaller than the apertures of the sheets which passed them, due to the updraft of air through the cloths.

It may also be expected, that the effective aperture sizes of some fine bolting cloths may decrease slightly with use under certain conditions, due perhaps to an adherence of substance to the threads. A fairly uniform rate of rejections and replacements of screens occurring in most mills, however, will probably leave the average age and so the average effective aperture size for each designation remarkably constant, and the average aperture width only slightly removed from that of the new material.

Influence Rate

In conclusion it must be pointed out, that in addition to separating mill stocks in particle size groups and controlling the percentages of these separations, the selected bolting cloths also may influence the rate of bolting, for as we noticed,

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cloths of the various materials and makes, even when the aperture sizes are alike, usually have unequal amounts of effective bolting surface, as the thinner threads allow more apertures per square inch. When changes are made in sifter sections from one brand of cloth to another, the bolting rate may therefore be found increased or decreased, and if so, the quantity of stock to the sections may have to be adjusted or the number of sieves corrected.

The properties of each kind of bolting fabric, the characteristics of the many different stocks being bolted, and several other factors, also influence the bolting rate, and thus help to determine the bolting capacity of the mill.

It is not our intention, however, to discuss this complex phase of bolting here, since our main task has been accomplished, which was to call attention to the benefits to be gained from using one common denominator for all bolting cloths, and particularly the one which especially seems to suit that purpose, namely the micron.

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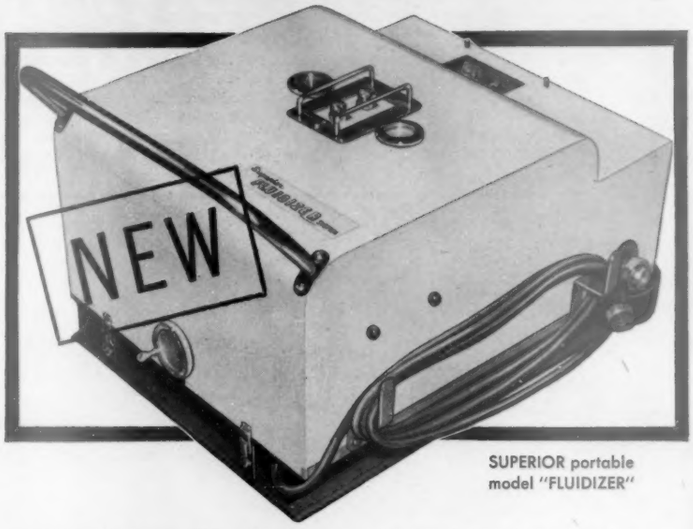

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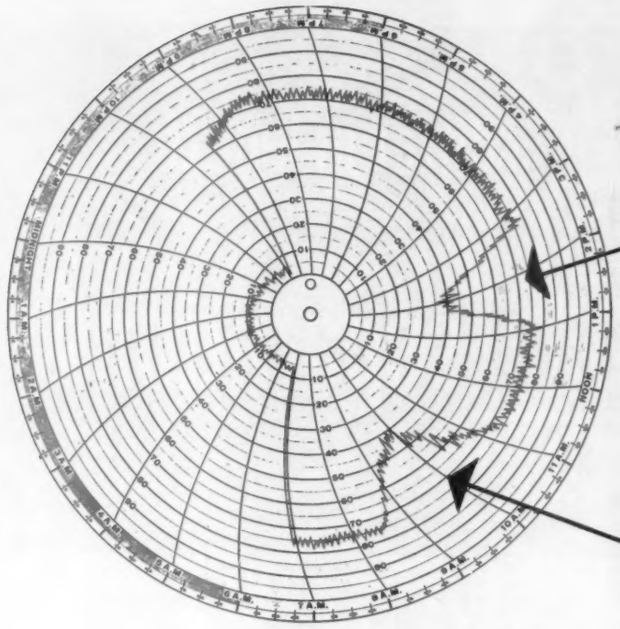

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Guaranteed to 1% accuracy, the Massometer will handle flour flows up to 200 pounds per minute... the Merchen Scale Meter, up to 600 pounds per minute. For other applications the Meter will handle flows up to 3000 pounds per minute. Both instruments have been tested and proved highly dependable in hundreds of installations throughout the country.

For complete information, write us today or communicate with your nearest W&T representative.

Massometer

Merchen Scale Meter

WALLACE & TIERNAN INCORPORATED

25 MAIN STREET, BELLEVILLE 9, NEW JERSEY

M-29

Because various grains differ in length

You can make exact separations

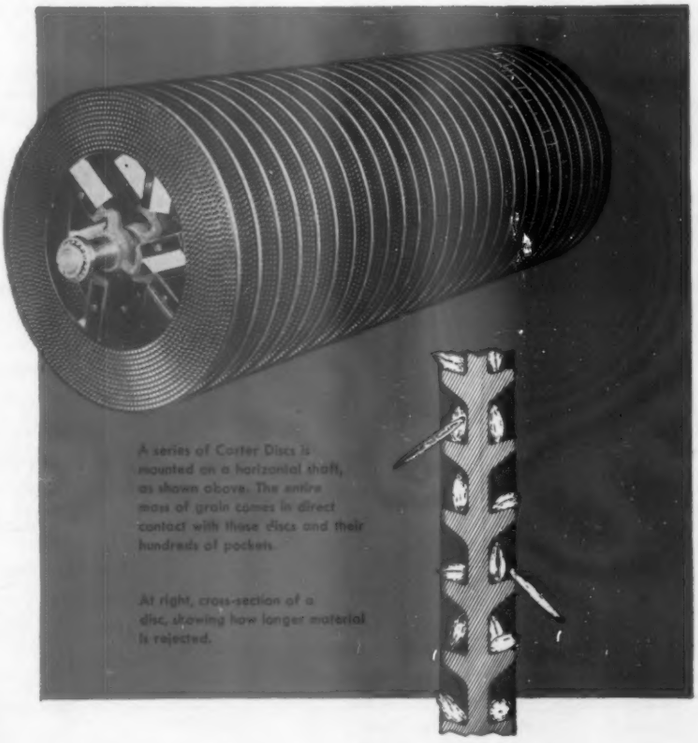
SOME GRAIN IS LONG

SOME IS MEDIUM

SOME IS SHORT

MANY grains are almost identical in width or thickness and would be difficult to separate if it were not for marked differences in their *lengths*. Oats, for example, are longer than wheat; cockle, on the other hand, is shorter than wheat. Because of these length differences, the Carter Disc Separator can make *exact* separations. By means of Carter Discs, which contain hundreds of undercut pockets, the grains or seeds are selected or rejected according to length. As the discs revolve through the grain or mixture, the pockets lift out the material they are designed to carry, and positively reject anything longer.

Take advantage of this accurate method of length separation. Install Carter Disc Separators now!



A series of Carter Discs is mounted on a horizontal shaft, as shown above. The entire mass of grain comes in direct contact with these discs and their hundreds of pockets.

At right, cross-section of a disc, showing how longer material is rejected.

CARTER DISC SEPARATOR

HART-CARTER COMPANY

673 Ninteenth Avenue N. E., Minneapolis 18, Minnesota

Engineers and manufacturers of grain cleaning machinery